

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Diamond Lake, Minnehaha County
2102-F-21-R-48
2015



Figure 1. Diamond Lake, Minnehaha County

Legal Description: T104N-R52W-Sec. 5

Location from nearest town: 13 miles north and 2 miles west of Humboldt, SD

Surface Area: 272 acres

Meandered (Y/N): yes

OHWM elevation: none set

Outlet elevation: none set

Max. depth at outlet elevation: 11.5 feet

Observed water level: full

Contour map available (Y/N): yes

Watershed area: no data

Shoreline length: no data

Date set: NA

Date set: NA

Mean depth at outlet elevation: 8.2 feet

Lake volume: 2,215 acre feet

Date mapped: 2011

DENR beneficial use classifications: (5) warmwater semi-permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation and (9) fish and wildlife propagation and stock watering.

Introduction

General

No information at this time.

Ownership of Lake and Adjacent Lakeshore Properties

Diamond Lake is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes. Game, Fish, and Parks (GFP) owns the majority of the lake basin as a Game Production Area and manages the fishery. The remainder of the shoreline is privately owned.

Fishing Access

The Diamond Lake Access Area was upgraded in 2005. It consists of a concrete plank boat ramp, gravel parking area, a boat dock and a toilet. Shore fishing access is available in the access area and along the county road grade on the south end of the lake.

Water Quality and Aquatic Vegetation

The water temperature during this year's lake survey was 24°C (76°F) and the water clarity was 51 cm (20 in). A minor algae bloom was occurring during the summer.

Fish Community

Diamond Lake has a simple fish community consisting of eight species (Table 1).

Table 1. Fish species commonly found Diamond Lake, Minnehaha County.

<i>Game Species</i>	<i>Other Species</i>
Walleye Yellow Perch Black Bullhead Green Sunfish Hybrid Sunfish Orange-spotted Sunfish Black Crappie	Common Carp Fathead Minnow

Fish Management

Fish kills have occasionally decreased fishing opportunity in Diamond Lake (Table 2). The lake is actively managed for walleyes and yellow perch by stocking as needed to achieve management objectives (Table 3).

Table 2. Fish kill history for Diamond Lake, Minnehaha County.

<i>Year</i>	<i>Severity</i>	<i>Comments</i>
2011	Severe	Winterkill - only a few perch and bullheads survived
2001	Light	Winterkill of carp, bullheads, suckers, perch. Live fish sampled.
1998	Moderate	Summer fish kill (August) small perch and bullheads

Table 3. Stocking history for Diamond Lake, Minnehaha County, 2006-2015.

Year	Number	Species	Size
2006	25,680	Walleye	Small Fingerling
	1,771	Yellow Perch	Adult
	1,107	Yellow Perch	Juvenile
	6,645	Walleye	Large Fingerling
2007	2,232	Walleye	Large Fingerling
	476	Yellow Perch	Adult
2008	4,325	Walleye	Large Fingerling
2009	100,700	Yellow Perch	Fingerling
2011	27,040	Walleye	Small Fingerling
	104,960	Yellow Perch	Fingerling
2012	40,350	Walleye	Small Fingerling
	81,210	Yellow Perch	Fingerling
2013	26,220	Walleye	Small Fingerling
	104,030	Yellow Perch	Fingerling
2014	256,000	Walleye	Fry
2015	17,640	Walleye	Small Fingerling
	544	Walleye	Juvenile
	33,800	Yellow Perch	Fingerling

Methods

Diamond Lake was sampled on June 16-17, 2015 with three overnight gill nets. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh ($\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, and 2 in) monofilament netting.

Results and Discussion

Net Catch Results

Black bullheads were the most abundant species sampled in the gill nets (Table 4). However, some yellow perch and a few walleyes were also sampled.

Table 4. Total catch from three overnight gill nets set in Diamond Lake, Minnehaha County, June 16-17, 2015.

Species	#	%	CPUE¹	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black bullhead	228	77.0	76.0	± 27.9	62.7	63	0	--
Common carp	30	10.1	10.0	± 4.4	15.2	13	4	--
Yellow perch	21	7.1	7.0	± 7.0	10.8	57	0	99
Walleye	15	5.1	5.0	± 1.3	4.8	8	8	77
Hybrid Sunfish	2	0.7	0.7	± 0.9	0.0	--	--	--

*10 years (2006-2015)

¹ See Appendix A for definitions of CPUE, PSD, RSD, RSD-P and mean Wr.

Table 5. CPUE by length category for selected species sampled with gill nets in Diamond Lake, Minnehaha County, June 16-17, 2015.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Black bullhead	--	76.0	28.0	48.0	--	76.0	+27.9
Common carp	2.3	7.7	5.7	1.7	0.3	10.0	+4.4
Yellow perch	--	7.0	3.0	4.0	--	7.0	+7.0
Walleye	0.7	4.3	4.0	--	0.3	5.0	+1.3
Hybrid Sunfish*	--	--	--	--	--	0.7	+0.9

*No length categories established. Length categories can be found in Appendix A.

Table 6. Gill-net (GN) and trap-net (TN) CPUE for selected fish species sampled in Diamond Lake, Minnehaha County, 2006-2015.

Species	Gear	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Black Bullhead	GN	33.3	12.0		6.0		59.0		100.7	152.0	76.0
	TN	289.4	256.6		17.1		184.6		96.8		
Black Crappie	GN	--	--		0.3		1.0		--	--	--
	TN	0.1	0.1		2.7		1.0		3.8		
Common Carp	GN	50.0	4.0		8.0		1.0		13.7	20.0	10.0
	TN	19.8	11.7		3.3		8.0		2.6		
Walleye	GN	10.0	6.7		6.7		0.5		--	5.0	5.0
	TN	5.3	4.0		6.5		0.2		--		
Yellow Perch	GN	14.7	1.7		11.0		13.0		6.0	22.3	7.0
	TN	1.9	0.6		2.6		3.6		10.8		

Walleye

Management Objective

- Maintain a walleye population with a total gill-net CPUE of at least 10.

Management Strategy

- Stock small walleye fingerlings at the rate of 70/acre (19,040) as needed to achieve the management objective.

The fifteen walleyes sampled in 2015 (Table 7) likely originated from the spring fry stocking in 2014 and the fingerling stocking in 2013 (Table 8). Stocking in eight of the last 10 years has only produced one CPUE meeting the current management objective. Age-0 walleyes showed up as bycatch in the age-0 yellow perch gear comparison study conducted in the fall. Juvenile walleyes (544) were also stocked in late fall 2015.

Table 7. CPUE, PSD, RSD-P, and mean Wr for all walleyes sampled with gill nets in Diamond Lake, Minnehaha County, 2006-2015. Stocked years are shaded.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CPUE	10.0	6.7		6.7		0.5		0.0	5.0	5.0
PSD	49	--		6		--		--	--	8
RSD-P	11	--		6		--		--	--	8
Mean Wr	85	82		81		--		--	--	77

Table 8. Walleyes stocked into Diamond Lake, Minnehaha County, 2006-2015.

Year	Number	Size
2006	25,680	Small Fingerling
	6,645	Large Fingerling
2007	2,232	Large Fingerling
2008	4,325	Large Fingerling
2011	27,040	Small Fingerling
2012	40,350	Small Fingerling
2013	26,220	Small Fingerling
2014	256,000	Fry
2015	17,640	Small Fingerling
	544	Juvenile

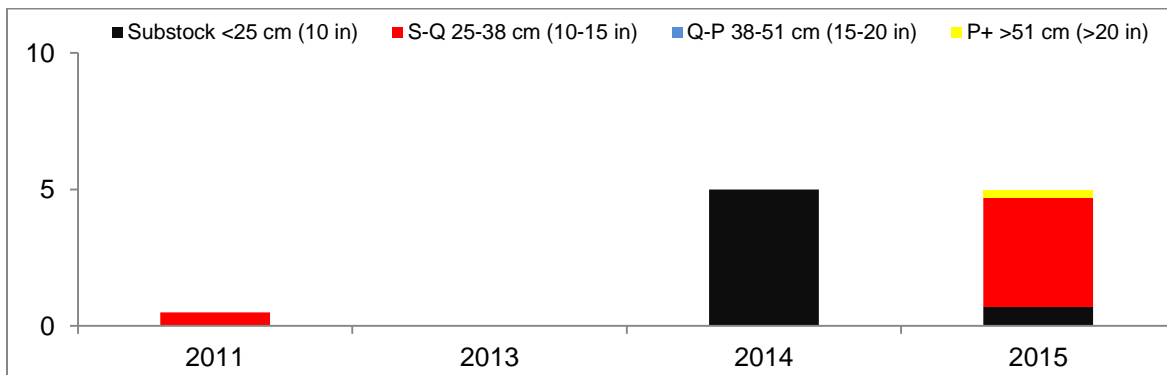


Figure 2. CPUE by length category for walleye sampled with gill nets in Diamond Lake, Minnehaha County, 2011-2015.

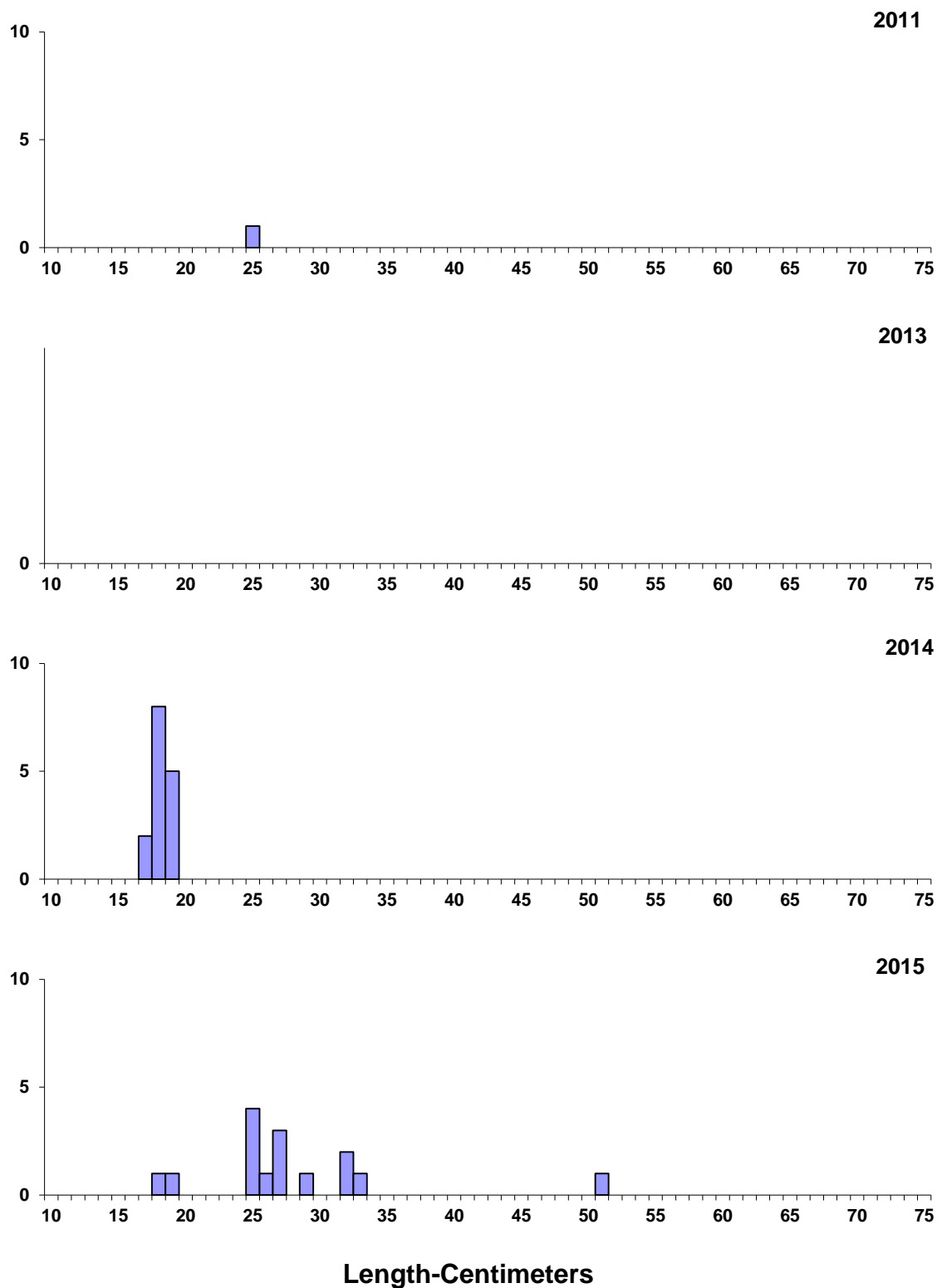


Figure 3. Length frequency histogram for walleye sampled with gill nets in Diamond Lake, Minnehaha County, 2011, 2013, 2014 and 2015.

Yellow Perch

Management Objective

- maintain a yellow perch population with a total gill-net CPUE of at least 25

Management Strategies

- stock small fingerling yellow perch as needed to achieve the management objective
- mark stocked small fingerlings with oxytetracycline (OTC) to enable evaluation of stocking contribution to the fishery

Yellow perch gill-net CPUE decreased in 2015 and is below the management objective (Table 10). All of the fish sampled were 16-22 cm (6-9 in) long (Figures 4, 5) and likely produced by stocking (Table 11) or natural reproduction in 2013.

Yellow perch fingerlings marked with OTC were stocked in 2015. Of the 65 age-0 perch sampled in the fall gear comparison study, 84% were OTC marked indicating a very good contribution to a moderate year class.

Table 10. CPUE, PSD, RSD-P, and mean Wr for all yellow perch sampled with gill nets in Diamond Lake, 2006-2015. Stocked years are shaded.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CPUE	15.0	1.7		11.0		13.0		6.0	22.3	7.0
PSD	87	--		85		38		0	0	57
RSD-P	16	--		12		0		0	0	0
Mean Wr	81	--		101		109		103	103	99

Table 11. Yellow perch stocked into Diamond Lake, Minnehaha County, 2006-2015.

Year	Number	Size
2006	1,771	Adult
	1,107	Juvenile
2007	476	Adult
2009	100,700	Small Fingerling
2011	104,960	Small Fingerling
2012	81,210	Small Fingerling
2013	104,030	Small Fingerling
2015	33,800	Small Fingerling

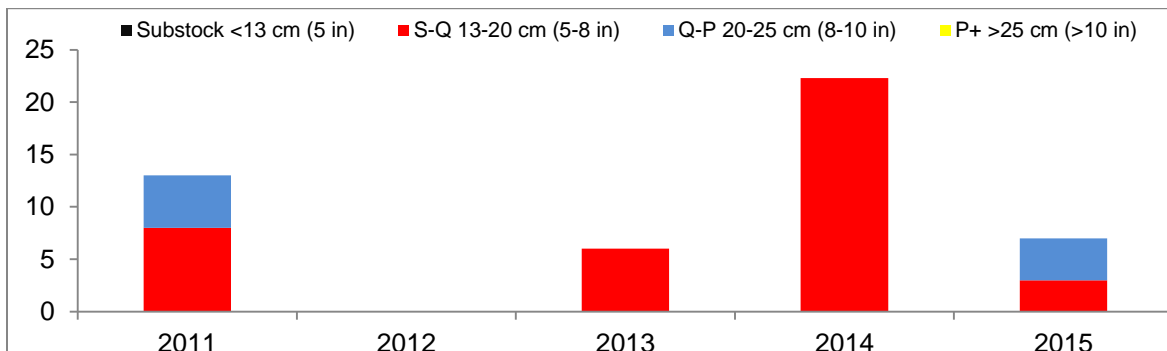


Figure 4. CPUE by length category for yellow perch sampled with gill nets in Diamond Lake, Minnehaha County, 2011-2015.

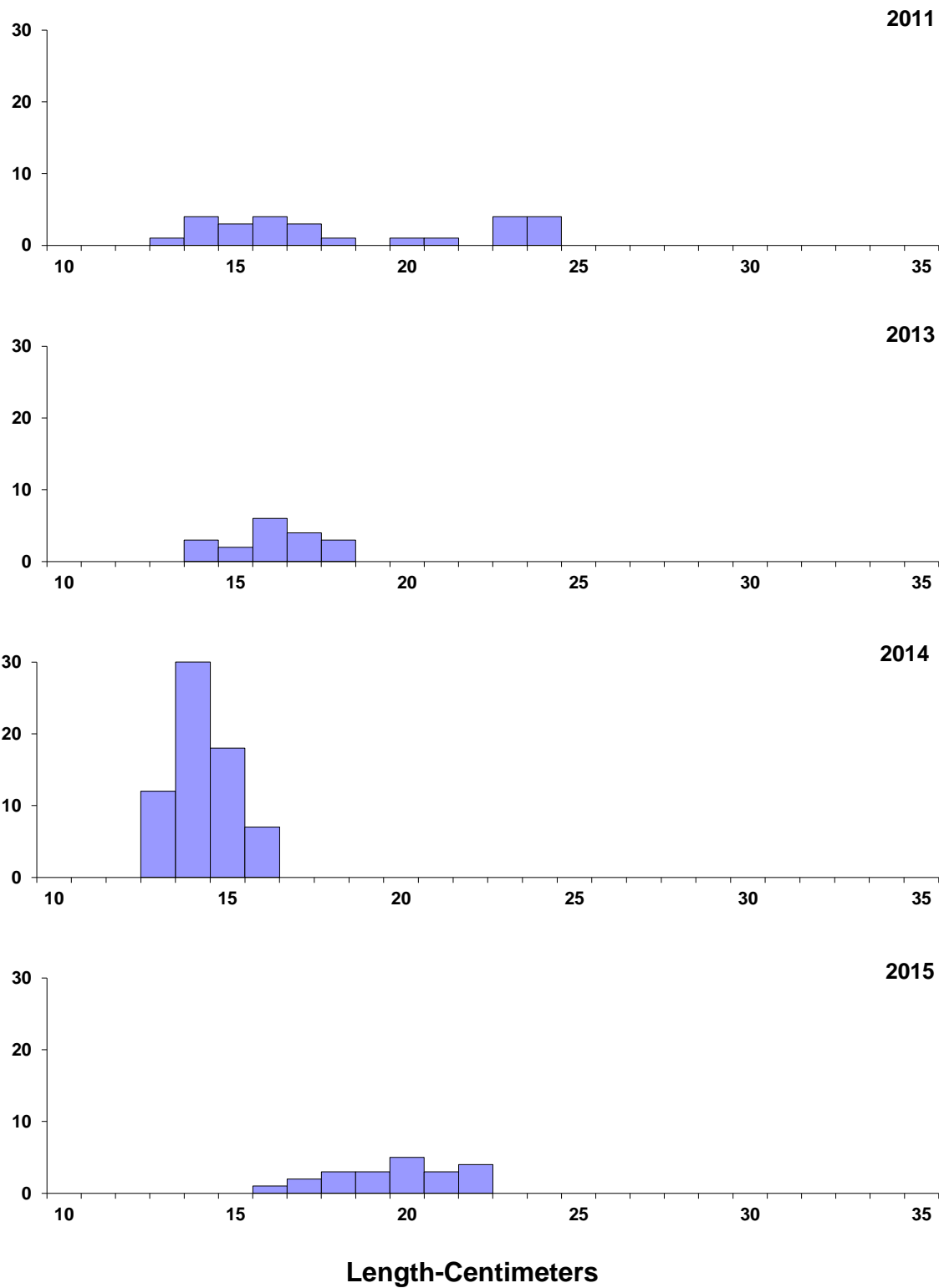


Figure 5. Length frequency histograms for yellow perch sampled with gill nets in Diamond Lake, Minnehaha County, 2011, 2013, 2014, and 2015.

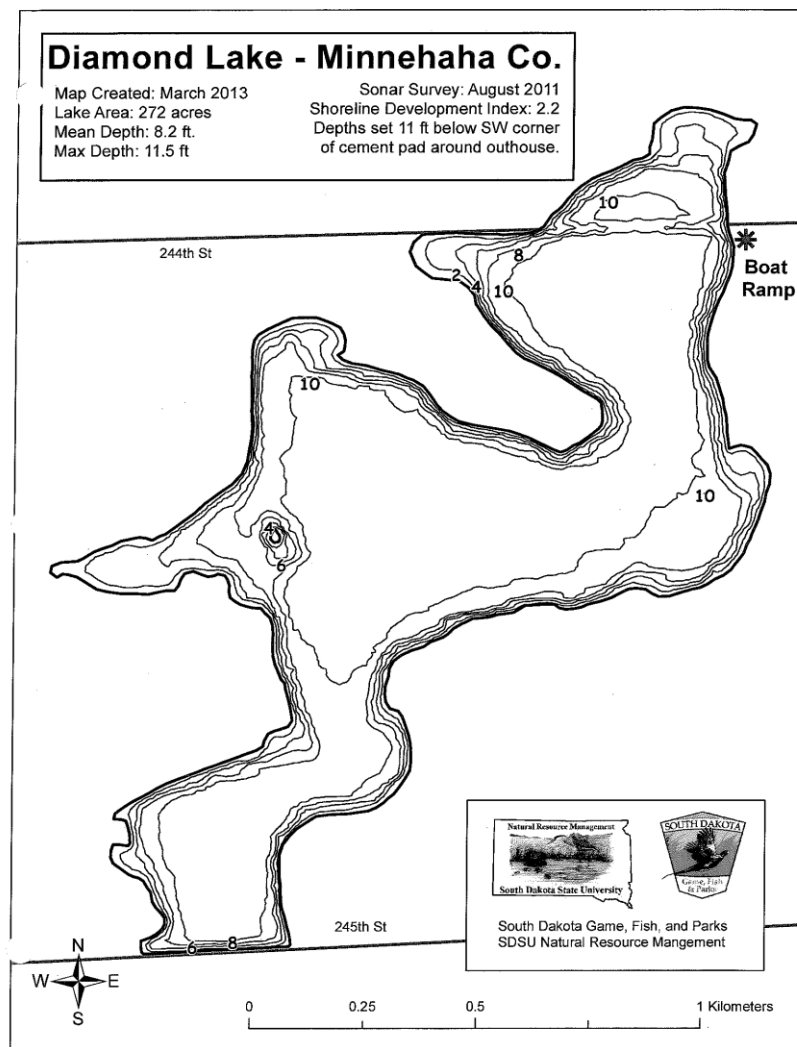


Figure 6. Contour map of Diamond Lake, Minnehaha County.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters (Inches in parenthesis).

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Black crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
White crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Smallmouth bass	18 (7)	28 (11)	35(14)	43 (17)	51 (20)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Bigmouth buffalo	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.